THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science

PUBLISHING OFFICE, No. 42 PINE STREET.

VOLUME XIII.—No. 8. WHOLE No. 260. | NEW YORK, MONDAY, OCTOBER 17, 1870. | $3 PER ANNUM IN ADVANCE.

New Wrought Iron Sectional Steam Boiler

The New York Safety Steam Power Company offer their Wrought Iron Sectional Steam Boiler, which the accompanying engravings fully illustrate, and the intelligent reader will readily understand, not only as being safe from destructive explosion, but also as being free from all those practical difficulties that attach to the various attempts to produce a safe steam generator.

This boiler is composed of lap-welded wrought iron tubes, five inches in diameter and six feet long; upon each end of the tubes is screwed a T head, the ends of which are milled to a true surface, so that when the tubes are placed in an upright position, and the end of the Ts are brought together, they form a horizontal pipe at top and bottom, connecting all the pipes in one row. The back ends of the rows are connected by a cross pipe at top and bottom. Stout bolts having heads which lock into cross pipes, pass through the T heads to the front of the boiler, where there are nuts by which all the joints are forced firmly together, and a perfectly tight steam and water connection formed throughout the whole system of tubes.

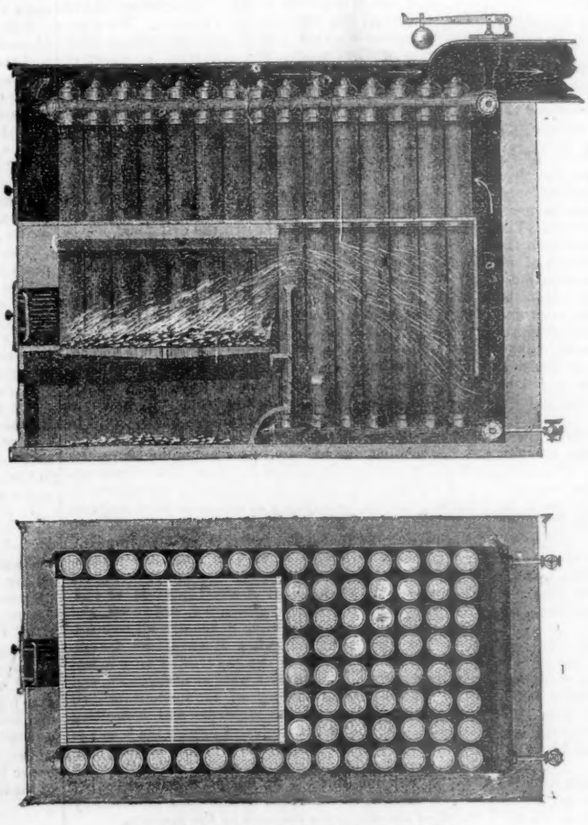
As it is impossible to make boilers which neither ignorance nor carelessness can destroy, the only way to secure safety is to construct them that when, through abuse or ignorance they fail the failure shall be harmless.

A boiler built of a series of tubes is peculiarly adapted to effect this end, as it will bear a large amount of abuse, and when it does give out, the part fractured merely acts as a safety valve to allow the confined steam and water to escape gradually, and therefore harmlessly.

Any combination of small tubes may form a safe steam generator, but be worthless for practical use, from want of ability to supply dry steam, furnishing what has been aptly termed "soda water" instead.

Such boilers are exceedingly wasteful of fuel, besides being dangerous to the engines, as so much water is liable to go over with the steam as to break down the engine, or it may suddenly empty itself of water and allow the tubes to burn.

This difficulty is entirely prevented by giving each tube an entirely independent circulation, which is effected by placing within each steam generating tube a circulating tube, which reaches from the lower T head to about the water level, the steam being generated in the annular space between the inner and outer tube forms a column of mingled steam and water, which is lighter than the solid column of water within the circulating tube, the difference in the weight of the two columns induces a rapid circulation. The steam separates upon reaching the water level, rising in the tube, and the water falling into the inner tube passes down, and returns in a continuous circuit.



SECTIONAL STEAM BOILER.

By means of this rapid circulation, perfect separation of the steam and water is effected, and dry steam is produced in tubes of such moderate diameter as would otherwise prime so badly as to be impracticable.

Unless proper provision is made for the deposit of sediment and foreign substances which almost all water contains, the interior of the tubes soon become coated, which reduces their steaming capacity, and unless removed, causes corrosion and burning of the boiler.

Rapid circulation sweeps the sediment off the heating surfaces, and carrying it down through the circulating tubes to the horizontal tubes below the fire, where the water being comparatively quiet, it can settle and be blown out. By removing the end caps, the horizontal pipes can be cleaned.

No boiler can be considered reliable unless it is accessible to clean in all its parts outside and inside, the accumulation of soot and ashes on the outside, prevents the application of the hot gases to the exterior of the heating surfaces, and the accumulation of the scale prevents the access of water to the interior of the heating surfaces, and results in serious loss of heat. The space between the tubes in this boiler, is sufficiently wide for the introduction of brushes for cleaning, and all parts can be reached through the furnace door and the door over the crown sheet. Each tube has a cap over its upper end, by unscrewing a nut it can be removed, and access obtained for scaling. This will rarely be required except where the water is exceedingly bad.

Economy of fuel cannot be realized, unless there is sufficient room for the gases from the burning fuel to be consumed, before they are cooled below the point of ignition, neither can they be allowed to pass away in large volumes, but must be broken up and evenly distributed over the heating surfaces. The rows of tubes are here placed sufficiently far apart to allow a sheet of flame to pass between and complete combustion among them; as the gases are reduced in temperature they settle down and escape under the curtain back of the tubes, then rise, turn forward among the tubes again, and escape into the chimney, as shown by the arrows, leaving their last measure of heat to dry the steam in the upper part of the tubes.

The arrangements for completing combustion, applying the hot gas uniformly to the tubes and readily absorbing it by the circulation within, and the production of perfectly dry steam, together with the means of keeping the surfaces clean outside and in, insures, not

only economy of fuel, but also the highest efficiency and durability.

Ease of transportation and erection are important considerations in any case, but vastly more so in distant and inaccessable places. This boiler is especially easy to transport and erect, each tube weighing about 150 lbs., being fitted by special machinery which makes them perfect duplicates; any number taken from a pile and screwed together fit perfectly, and make tight joints, metal to metal. In case it is necessary to replace a tube it is easily done by an ordinary workman.

As the fire is surrounded by tubes on all sides but the front, only thin brick walls are necessary on three sides, requiring very little masonry, and that of the simplest kind.

For portable purposes the tubes are set upon a cast iron base, and casing around the tubes with cast iron ends, and side pannels of Russia iron made double and filled with plaster of Paris to retain the heat. A boiler cased up in this manner is easily transported, has a very neat appearance, gives off but little heat, and can be used without objections, wherever a stove would be allowed. These boilers are warranted safe in every particular, or no sale.

For further particulars address or apply to the "New York Safety Steam Power Co.," 44 Courtlandt Street.

This novel and excellent boiler is now on exhibition at the Fair of the American Institute, 63d street and 3d Avenue, N. Y.

Chemical Repertory.--No. 39.

OCTOBER 17, 1870.

Editor—HENRY WURTZ.

Editorial.

THE NEW YORK LYCEUM OF NATURAL HISTORY.

This Institution, one of the oldest of its kind in America, is still the only practical working Association devoted to General Science that has ever been kept alive in this shamefully, or rather shamelessly, unscientific metropolis. It is therefore necessarily the resort of the few of us who have assumed the thankless task of keeping alive the torch of Science under the ribs of Mammon. The original name and organization of the Lyceum, still substantially adhered to, are by no means altogether satisfactory to many of the active members, and it is to be hoped that it may be found practicable to modify both so as to bring them more into accordance with the exigencies of the case. The present name is in reality an important drag upon the Institution, conveying an incorrect impression of its present scope and tendencies; and there is no more reason why it should be retained than there was in the case of the old *American Association of Geologists and Naturalists*, which, by the impulse of a more comprehensive designation, became the present noble AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. *New York Lyceum of the Natural Sciences* would be better, but I do not propose here to urge any definite suggestion as to any special name.

The regular weekly meetings of the LYCEUM have been resumed for the season, after the usual summer vacation, and on last Monday evening, the 10th inst., occurred the first monthly meeting of the Chemical Section. Communications were made by Messrs. C. A. SEELY, OSCAR LOEW, and H. WURTZ, and Prof. HENRY MORTON, of the new STEVENS INSTITUTE in Hoboken, Editor of the *Journal of the Franklin Institute* (formerly Secretary of the FRANKLIN INSTITUTE). Of all these we have notes, but cannot get them into our crowded columns on this occasion. In our next we shall do th m at least partial justice.

Prof. SEELY's communications were upon two subjects, one a most important discussion of the liquids best adapted to use in *Ice Machines*, in the course of which he exhibited diagrams of elaborately constructed curves for different liquids, whose ordinates were temperatures and abscissas pressures, to illustrate his views. We have a promise from the author of an exposition of these subjects from his own pen. Professor SEELY also gave us information, new to most present, of an extensive use, just now, in the manufacture of imitations of ivory, for billiard balls, etc., of a newly discovered property of gun cotton of being softened, rendered plastic, and compressible, by incorporation with *camphor*. A collodion may be made by dissolving guncotton in an alcoholic solution of camphor. He has discovered also that gun cotton will explode in the vapor of camphor at a temperature as low as boiling water.

Dr. LOEW gave results of experiments to test the entity of *Antozone*, which gave him results favorable to the existence of what is called by that name, though he rejects the ideas of SCHOENBEIN, MEISSNER, and others, as to the opposite *electric* relations of ozone and antozone.

Prof. WURTZ presented a new theory or generalization, of the *Relations of Silica to Life* throughout all geological ages. He exhibited an elaborate diagram, representing the "*Geogonic Migrations of Silica throughout the Kingdoms of Life*," and brought forward, among other peculiar views, which he proposes further to sustain, in future communications, the new Postulate that all Silica, in isolated forms, even when crystalline, as quartz, owes its primary isolation from the original silicates of the continental nuclei to the agency of Plant-Life.

Prof. MORTON exhibited photographic negatives of sun-spots, from Prof YOUNG of Dartmouth, *the first pictures ever yet obtained through the Spectroscope*; with photographic prints of a new and ingenious spectroscope of Prof. YOUNG, which has enabled him to attain this surprising result. H. W.

[Some comments on the following, which were prepared for insertion here, are unavoidably crowded out, but will appear in our next.—H. W.]

THE LONDON GAS REFEREES AND THE SULPHUR QUESTION.

[Abstract, by Prof. SILLIMAN.]

The Gas Referees of London have issued, July 13, 1870, their "*First Report upon the Sulphur Question*," which has just come to hand, and is full of very curious and surprising evidence.

The first position taken is that the present processes for sulphur purification are so defective that even doubling their extent, in most cases, produces no effect in the purity of the gas (in sulphur.) Then the production of gas in summer is only one-half what it is in winter, while the purifying surface remains the same; nevertheless it appears from the average of the daily testings at the three principal London companies there is no important difference in the contents of sulphur in mid-summer and the mid winter period. It still remains undetermined in what form (other than sulphydric acid, which is all removed by the existing means of purification) the sulphur in gas exists. The commonly repeated assertion that it exists as bi sulphide of carbon is without proof, Mr. Kirkham, engineer of the Imperial Company, having obtained a supply of triethylphosphine from Prof. Hofmann, applied this test (conceived to be the best known test for bisulphide of carbon) to gas containing a large amount of "sulphur impurity," other than sulphydric acid, without obtaining any evidence of the presence of bisulphide of carbon.

Until we have something more definite of the form and manner of this sulphur impurity in purified coal gas, we need hardly hope to catch the evil doer.

The referees acknowledge the efficient aid furnished them in their researches by the zealous co-operation of the various London gas companies, placed by the act under their surveillance. And the engineers of nine large gas-works, included under those acts, are now prosecuting daily researches and tests in connection with the referees, thereby giving a magnitude and reliability to investigations respecting purity hitherto unattainable. While experiments have been undertaken to ascertain the form in which the sulphur impurity actually exists in gas, the referees have sought to fix the relative efficacy of each of the separate stages of purification, and of each process employed by the several companies to remove sulphur. The results are most unexpected. First, as regards the scrubbers: it appears that in the majority of instances more sulphur was found in the gas coming from the scrubbers than before it entered them. These scrubbers were supplied, in most cases, with ammoniacal liquor and among others, Mr. Livesey's scrubber was used. The experiments were conducted as follows: A small portion of gas, just before it enters the scrubber, was drawn off, and made to pass over oxide of iron, to remove all free sulphuretted hydrogen; thereafter it was tested for sulphur. In like manner was the gas treated after it had left the scrubber. These facts were so unexpected, and are so wholly contradictory of the long-established opinions and practice of gas engineers and consulting chemists, that one of the engineers tore up the result of his testings, thinking that he would only stultify himself by sending in such returns, which he fancied must be due to some mistake on his part, little expecting they would be corroborated by the facts obtained by the other gas engineers engaged in the inquiry.

The referees suggest that the cause of these unexpected results may be found in the probable conversion of a portion of the HS which enters the scrubbers into new sulphur compounds, which escape the action of the alkaline wash. While this inquiry is still in progress, viz., to what extent the "scrubbing" process can be relied on to reduce the sulphur impurity, experiments of a like kind have been set on foot to test the efficacy of the purifiers of various kinds in use in gas-works. The results have been very disappointing—the gas in some cases *was found to conrain more sulphur when it left the purifying material than when it entered it.*

At one of the largest works in London, where both oxide of iron and lime are employed in purification, a series of experiments, carried on continuously for a month, showed the following results;—

Sulphur per 100 feet of gas at inlet of purifiers.	Sulphur per 100 cub ft. of gas at outlet of iron purifiers.	Sulphur per 100 feet of gas at outlet of lime purifiers.
21·18 grains.	29·18 grains.	24·46 grains.

More sulphur in the gas after passing through the oxide of iron purifiers than on entering it.....	8 grains, or 37 per ct.
More sulphur in the gas after passing through both the oxide of iron and lime purifiers	7·28 grains, or 34½ per ct.

In other words, purifiers designed specially to remove sulphur appear to give out gas bearing one-third more sulphur than when it entered them!

In another return from a different gas-work, in which all the processes of purification are included, the results (given in full of the referees' report) are actually *nil*—the gas having passed through all the stages of purification without any dimunition of its sulphur impurity.

"The experiments, however, corroborate the long-established opinion as to the superiority of lime over oxide of iron as a purifier of sulphur compounds. This is clearly shown by the result of the experiments, in possession of the referees, upon gas made at the Central Company's works at Bow."

There is no question as to the power of oxide of iron and lime to withdraw a large portion of sulphur from gas under certain circumstances: but it is evident, from the facts already obtained in these experiments, hat an adequate knowledge of how to apply these purifying materials in gas-works so as to produce satisfactory results, has as yet to be acquired. Laboratory chemistry is obviously at fault here; no appreciable advance has been made in sulphur purification during the last ten years; and the real means of improvement must be looked for in experiments on a manufacturing scale in the gas works.

The referees then consider the probability of the gas obtaining a fresh supply of sulphur impurity from the foul water of old gas-holders, upon which an oil is found floating known to be rich in sulphur, and which, especially in hot weather, must find its way into the gas by volatilization from the sides of the rising holder. They state that it has recently been demonstrated in case of impurity in the gas of the Central Company that "if 'foul' gas (*i. e.*, containing sulphuretted hydrogen) once finds its way even for a few hours into the gas-holders, the impurity is so quickly absorbed by the water in the gas holders as to foul the gas for many weeks afterward."

The referees next touch lightly on a point which appears to be of the first importance in considering the nature of the sulphur-compounds existing in gas. They say "it has been ascertained if gas free of sulphuretted hydrogen is passed through an iron tube heated to 500° F., the sulphur compounds it contains are broken up, carbon is deposited, and the gas is found copiously charged with free sulphuretted hydrogen. Possibly this transformation may occur at a much lower temperature, as by the sun's rays in a hot day acting on the iron sheets of the gas-holders, and thus the often mysterious appearance of HS in the gas distribution be accounted for,—an impurity, the least trace of which in the gas is forbidden by the recent London gas acts under a heavy penalty.

It appears to us that the experiments recorded by Rev. Mr. Bowditch in his book on gas have been overlooked by the gas referees and by gas engineers and chemists as well, and that they are remarkably confirmed by this experiment of the referees. Mr. Bowditch discusses this subject with considerable acuteness, and describes his method of removing the sulphur "impurity" *i. e.*, the sulphuretted hydrocarbon series of gases—by means of a tube containing quick lime heated by a lamp-flame or furnace, over which the gas to be purified is passed—and the sulphur removed by the lime at a high temperature. Additional researches are demanded in this direction, and if so low a temperature as 500° F. will effect the change, it is certainly possible to devise a process which can be employed in the gas-house in a large way to desulphurize the whole make of the largest gas-work.

AMOUNT OF SULPHUR IN LONDON GAS.

Prior to August, 1869, the quantity of sulphur in London gas was known only from the occasional testings of Dr. Letheby. Subsequently we have the daily testings in the five (5) testing stations established in conformity with the instructions of the referees under that act. The amount of sulphur in the gas of the Chartered, the Central, and the City companies has averaged as follows:—

Dr. Letheby's Occasional Testings—1864–68.

Year.	Central Co.		City Co.		Chartered Company.									
					Curtain Road.			Brick Lane.			Westminster.			
	Max.	Min.	Max.	Min.	Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.	
1864–5	35·0	16·6	29·7	14·5	33·7	14·4	20·1							
1865–6	33·9	14·4	28·2	14·2	30·7	18·0	21·9							
1866–7	29·96	14·79	24·97	7·12	27·80	10·48	17·77							
1867–8	34·61	7·4	17·44	8·19	19·06	8·79	19·57							
1868, Feb. to Aug.	20·9	8·8	25·11	10·86	23·90	14·27	19·08							
1869, Aug. to Dec.	37·02	4·01	26·8	12·8	25·0	8·9	20·9	33·7	17·4	21·4	36·8	14·7	28·6	
1870, six months.	24·9	8·4	25·1	14·6	25·8	15·3	22·8	30·1	18·6	25·0	36·7	16·6	29·2	

Gas Examiner's Daily Testings—1869–70.

The visible improvement in the gas of the Chartered Company as exhibited above *is owing to the adoption of lime in the purifiers.* In the earlier years of the above series, the gas of this company was fouler with sulphur than that of any of the others. At that time they used oxide of iron, which is still used by the other companies. The works of the Central Company at Bow, are in a poor locality, where there are also numerous chemical and other works, producing greater nuisances than that arising from the use of lime at a gas work. At the other London works the use of lime is inadmissible owing to the nuisance it occasions, when exposed after use. The Imperial Company at Fulham are in a locality more thinly peopled than that around the gas-works at Bow; but the inhabitants belong to a wealthier class, and when the Imperial Company, two years ago, attempted to adopt lime as a purifier in their Fulham Works, the complaints made and the indictments threatened compelled the company to fall back at once upon the ordinary iron process, which they had thought to abandon.

THE REFEREES' NEW SULPHUR TEST.

The referees describe at length and with figures the new form of sulphur test designed to replace the ordinary form of Letheby and which they show is able to give more exact results than the latter. They substitute carbonate of ammonia for liquid ammonia as giving a more constant exhalation of vapor during a long continued experiment; and they also employ a shield to regulate the draft and use a trumpet tube of broader mouth than was used before. The gas is burned at the rate of about half a cubic foot per hour from a small steatite Bunsen burner mounted on a pewter foot of peculiar form, so arranged as to contain the lumps of sesquicarbonate of ammonia sustained on a perforated plate acting as a strainer to regulate the draft. Dr. Odling has examined and approved the apparatus in a letter to the referees which is given at length in the report. He adds, after his results:—

"Altogether I find your process actually easy of performance, while it is certainly more trustworthy and accurate than any other process hitherto contrived for the use of practical men. In particular I consider the substitution of solid sesquicarbonate of ammonia for the solution of ammonia hitherto used as a very valuable improvement in the process."

Dr. Odling thinks that it would give higher and therefore better results if the gas was burned at a somewhat more rapid rate than one half cubic foot per hour.

In conclusion the referees give at length their reason for witholding at present any opinion as to what if any maximum of sulphur may be safely allowed by law to be present in illuminating gas. For this purpose they give a table showing the fluctuations in the amount of sulphur burned in the gas of the several companies under the act of 1860, when occasional testings only were made. From this it appears that if testings had been made daily the Chartered Company with single station at Curtain Road would have been liable to penalty 157 times in the year; the City Company, 124 times; and the Central Company, 217 times. The limit being 20 grains of sulphur in 100 cubic feet of gas. Had the gas been tested during those years in a more perfect apparatus, the penalties to which the company would have been liable would have been still more numerous.

To show how little is as yet known as to the causes of variation in the amount of sulphur in gas and how far we are yet from being able to fix upon any maximum or minimum or average which shall be a safe and just guide in legislation, the referees publish at length an elaborate table of the daily testings for sulphur made at the official testing stations during the past six months. The next noticeable feature seen in this table is the extremely fluctuating character of the returns for sulphur which are attributable to no known cause. Thus the daily fluctuations in the sulphur at the Central Company "where the most efficient mode of sulphur purification yet known (namely, by dry lime) is in use," show that, although the average amount of sulphur is much below that of the other companies, the fluctuations are so constant that if the maximum were fixed by an average, the company would be liable every other day to a penalty of £50. Meantime the study and careful investigations of the referees, aided by the zealous co-operation of all chemists and engineers of the several companies, can hardly fail to discover the causes of the mysterious fluctuation in this element of impurity in gas and give us, it is to be hoped, some important improvement in our existing means of purification.

The report is signed by its secretary, T. Foster, and bears marks of much care and fiddlity in its preparatiofi. It is printed on one side of large folio sheets, 11 in number, and is a valuable addition to the literature of the gas-lighting industry.—*Am. Chemist.*

The London *Journal of Gas-Lighting*, of August 16, makes the following remarks in comment on the report of the referees, which is above condensed:

"The gas referees have published a 'First Report' upon the sulphur question, which will be found *in extenso* in another place. The report is somewhat lengthy, and it is impossible here to give a full criticism of its contents. Starting with the assertion that they have examined the various methods hitherto proposed, as well as those at present in use, for purifying gas from sulphur, and after a remarkable account of the composition of illuminating gas, they proceed to state that every mode of purification which consists in passing the gas through various substances as through a sieve, abstracts floating particles of hydrocarbons, and therefore reduces illuminating power. This is a statement which can only be received with many qualifications. When gas is properly condensed the purifiers take out no hydrocarbons which it is advisable to retain. They next make the not very original remark that the efficacy of the purifying material is mainly dependent upon the length of time the gas is in contact with it, and instance the fact that in summer, when only half the quantity of gas which passes in winter is sent through the same extent of purifying surface the amount of sulphur in the gas is practically the same. Here they appear to have overlooked the fact that the purifying materials are not so frequently changed in summer as in winter.

"As regards the form in which the great bulk of sulphur exists in what we may call purified gas, we did not suppose there could be two opinions. It is quite likely that there may be sulphuretted hydrocarbons, but no chemist of any repute has ever expressed a doubt that the chief sulphur-holding ingredient is not bisulphide of carbon. The formation of this body in the manufacture of gas is easily accounted for, and the changes which take place in processes which certainly remove all sulphur from gas point to the fact that the sulphur compound is bisulphide of carbon; and it is also asserted, with how much truth we cannot at this moment say, that the bisulphide may easily be isolated from the gas.

"The most remarkable part of the report is that which relates to the efficacy of the various stages of purification in the elimination of sulphur. The conclusion to which the referees have come is that gas when it leaves the purifiers contains more sulphur than when it enters them. This is so manifestly absurd that we need say nothing about it. The statement that gas, after passing through oxide of iron, contained 37 per cent. more sulphur than before, carries its own refutation. Sulphuretted hydrogen, if the oxide was good for anything, must at all events have been taken out; and if it is pretended that the sulphur came out in some other form, still, according to common notions, it is impossible that more sulphur could have emerged from than entered the purifiers in any form whatever. The experiments on this point are evidently worthless. There is, we are inclined to believe, a gross error somewhere. We are not told by what means the amount of sulphur was determined in the experiments, and we decline to accept as conclusive, on such an important point as this, any results but those obtained by known perfect processes for the *exact* determination of sulphur, such as combustion in oxygen, or Mr. Valentin's method.

"We may pass over the ideas of the referees as to the possible production of sulphuretted hydrogen in the gasholders on a hot day, and go on to the amount of sulphur impurity in gas. The practical fact shown in the tables given by the referees is that the gas of the Great Central Company contains less sulphur than any other, and they ascribe this to the use of lime. Lime, however, we believe is not used alone in the Great Central works; and a larger acquaintance with London works might have taught the referees that even lime alone may be used to as little advantage as oxide of iron. M. Ellissen several years ago pointed out that Dr. Letheby's apparatus failed to detect the whole of the sulphur in gas, and the fact has since been well known to instructed gas engineers. We have no assurance that the 'new sulphur test' is not just as faulty as the old. The sole advantage the former possesses is that the products of combustion are prevented from escaping from the large end of the trumpet-tube; and it is very easy to alter the old Letheby apparatus so as to effect the same object. We have only to turn up the edges of the trumpet-tube, so as to form a cone over the Leslie burner, or, more simply, to put a perforated plate beneath, so as to prevent any air from passing, except through the centre of the burner, and results may be obtained even higher than by the new apparatus.

"The difficulty the referees have in fixing the maximum for sulphur impurity is, no doubt great, and is likely, we fear, to remain so for years to come. In the meantime, any light that they can throw upon the processes of purification will be cheerfully received."

The same Journal, of August 30, further remarks:

"There is something so astounding in the announcement that some of our methods of purification add to the amount of sulphur in forms other than that of sulphuretted hydrogen, that we think we may justly complain that precise details of the experiments which have led to this conclusion have not been given in the referees report. We should have been told, for instance, what kind of oxide was used, and how it was used; for it is conceivable that, in the passage of gas under some pressure through a layer of heavy bog ore three feet thick, reactions might take place which would not happen with lighter oxide differently distributed, and with the gas under less pressure. In the former case the conditions would somewhat resemble the passage of mixed gases through the pores of charcoal, where, from the intimate contact into which the gases are brought, chemical changes take place which do not occur under other circumstances. Next we ought to have been informed what apparatus was employed in the estimation of the sulphur. The Letheby apparatus, even in the most capable hands, is liable to give discordant results, and for aught we know to the contrary, variations just as great may be obtained with the new sulphur test. In Dr. Odling's hands, it is true, the new apparatus gave remarkably uniform results; but we have at present no assurance that in the hands of ordinary experimenters the referees test may not fail to give results equally uniform. In fact, it seems to us quite possible, and we think it probable, that the apparent addition of sulphur compounds to the gas in the experiments mentioned is the result of errors in the estimation of the sulphur. Nothing but the adoption of rigorously exact methods of determination, such as we mentioned in our last, would convince us that such a transformation of sulphur compounds as is supposed, takes place under any circumstances, and then we require to know the circumstances under which it does happen.

"The results of the testings for sulphur given in the report we consider highly instructive. They show clearly the value of different modes of purification, and it is desirable that we should know what these modes are. The method pursued by Mr. Harris at the Great Central works obviously at times reduces the sulphur to a minimum, and the average results are nearly as good as any obtained in the kingdom. For this reason the publication of a full description of the plan would have been valuable. The daily fluctuations are, as it is said, somewhat embarrassing, but not, perhaps, altogether inexplicable. On looking at the numbers there seems to be a tendency to (not very pronounced, it is true, but still enough to excite suspicion that there is) a gradual rise from a minimum to a maximum, and we should like to know what changes were made in the purifiers in the intervals. With Mr. Mann the results of purification are much more uniform, a circumstance he and the referees are unable to explain. But surely the explanation is to be found in the method pursued, if we only knew what it is. To say that it is not due to chemical science and appliances, but to the perfection of mechanical details, is no information at all. But we think it may be due to both. Mr. Mann, for one thing, carefully picks his coals. Now the picking of coal is a mechanical detail, but the careful exclusion of

pyrites from the retorts is a chemical reason why the sulphur in the gas should be a small and uniform quantity. The great defect of the report is the absence of information. There is this practical fact in the table we print on page 620—viz., that in the year 1869-70 the average amount of sulphur in the Great Central gas was 12·6 grains; in the City 19·8 grains; in the Curtain Road, 21·6 grains; in the Brick Lane, 24·7 grains; and in the Westminster, 28·8 grains. Now the great business of the referees should have been to have ascertained precisely the causes of these large differences (for they are in the working processes), and to have applied the results for the benefit of gas managers and the public. Instead of this they appear to have been groping about in the dark for things which lie out in the broad daylight."

Practical Management of Gas Works.

By James R. Smedberg.

[Written expressly for this Journal.]

NUMBER X.

Having mentioned 21 gallons as the quantity of water necessary to the condensation of 1000 cubic feet of gas, it is proper to add that this quantity is obtained by deduction from D'Hurecourt's figures, and probably relate to the Newcastle, French, and Prussian coals most in use in French gas-works. Clegg very truly remarks (4th edit. p. 184): "Some kinds of coal require more condensing powers than others. The coals from the midland counties, for instance, yield twice the quantity of aqueous vapor that Newcastle coal produces during distillation," etc., etc. And as a case in point I may remark that the King street station of the San Francisco works were originally constructed with the washer between the retorts and condenser. In reversing these to their proper sequence, the water connections of the condenser were accidentally left untouched, so that the water entered near the gas-inlet and came out near the gas outlet; consequently neither condenser nor purifiers did their work.

The following are some notes made preliminary to correcting the difficulty:

KING STREET STATION.

Gas made per day..... 382 M. c. f.

Water used by condenser per day... 16,425 gals.

Temperature of Gas.		*Temperature of Water.*	
Inlet.....	140° F.	Inlet.....	67° F.
Outlet	88° F.	Outlet.....	98° F.
Loss of temp....	52° F.	Gain of temp.....	31° F.

The coals used were about half Nanaimo (from Vancouver's Island) and half Sydney (from Australia).

From these data we obtain the condensing water required by this mixture of coal, thus

$$\frac{16.425 \times 31}{382 \times 52} = \frac{6}{25 - 10}$$

gallons of water per M. c. f. Thus, by inefficient use, the waste of water per diem was $16.425-(382\times25.6) = 6.645$ gallons, while the gas was cooled only to 88 deg. instead of 67 deg., thus embarrassing the purifiers. The adjustment of the water connections, and erection of vertical plates made the condenser a perfect one.

Remembering Clegg's remark, above quoted, that the work of the condenser is proportionate to the water-vapors in the gas, we can hardly help realizing that the "separator" is a valuable adjunct, since in it almost all vapors whose liquids have boiling points below 140 deg. F. will be separated, instead of sweeping on in a hot torrent to surrender their heat to the condenser.

It is to be remembered that it requires no more water to cool gas from 200 deg. to its own temperature, than from 100 deg.; hence there would be no economy in condensing the gas first by air and afterward by water. And while, at certain external temperatures, an atmospheric condenser might be relied on, the saving of motive-power (or water rent) would scarcely, during the brief term of such conditions, represent the annual interest upon an expensive air-condenser. For winter temperatures, where it is not desirable to cool the gas to the temperature of the water, the quantity of water necessary would be found by the formula

$$Q = \frac{G. \times (T-T')}{(t.-t')}$$

in which Q represents the quantity sought, in gallons per M. c. f.

$G.$ the number of gallons per M. c. f. for equal changes of temperature.

T the temperature of gas-inlet.
T' " " " gas-outlet.
t " " " water-outlet.
t' " " " water-inlet.

In the case of the last named coals, where $G.$ is found equal to 25.6, let the number of gallons be found which will be necessary when the water-temperature is 38 deg., and it is required to cool the gas from 140 deg. to 50 deg. By substitution we have

1st. $$Q = \frac{25.6 \times (140-50)}{(140-38)}$$

2nd. $$Q = \frac{25.6 \times 90}{102}$$

3rd. $Q = 22.6$ gallons per M. c. f.

The functions of the condenser being understood, I give below a record of some observations made at the Howard street station, San Francisco Gas Works, while testing the ammoniacal liquor for manufacturing value. Perfectly aware that the neutralization by sulphuric acid does not give an absolute test of the various forms of ammonia, I yet adopted it as accurate enough for my purpose. It will probably continue to be used by manufacturers of ammonia from crude liquor, in conjunction with that simplest of all standards, the hydrometer.

It will be seen that the liquor gained steadily in ammonia after leaving the hydraulic main—partly because its temperature steadily fell, and it so gained in absorbing power, and partly because the ammoniacal gas was taken up more largely in consequence of longer contact with the water-vapors. There is a run of about 250 feet of 16-inch pipe between the hydraulic main and the condenser inlet, the fall being principally toward the former. The condensing system consists of annular columns of boiler plate three feet in exterior diameter, preceded by two large jet-washers. These last are now used as condensers, their jets being discontinued and applied to the last two condensing columns.

The figures in the first column indicate the number of fluid ounces of 66 per cent acid (commercial "oil of vitriol") required to neutralize a gallon of the liquor. This was determined in each case by adding acid to say 16 ounces of the liquor, until blue litmus paper was faintly reddened. We weigh the beaker of acid before and after this step, and note the difference in grains; and then, by reducing a simple equation, determine the value of the liquor.

Let us suppose that it requires 501 grains of acid to neutralize 16 ounces of the liquor, we then have the equation $\frac{128}{16} \times \frac{501}{437.5} = 9.16$ and find the liquor to be of 9.16-100 ounce strength.

The simpler way is to employ the following

Rule.—*Multiply the number of ounces of liquor experimented upon by the constant* 3.42, *and divide the weight of the acid in grains by the product.*

Thus: $$\frac{501}{16 \times 3.42} = 9.16$$

VALUE OF AMMONIACAL LIQUOR AT HOWARD STREET STATION.

May 12, 1870.

	Oz of Acid to Neut. 1 Gallon.	Density by Hydrometers.		
		Sp. Gr.	Beaume.	Twaddell.
Hydraulic Main.....	4	1.010	1½	2
Washer Inlet.....	6.5	1.016	2	3¼
" Overflow.....	8.8	1.022	3	4 4-10
1st Condensing Column...	15	1.037	5	7½
2nd " "	17	1.042	6	8½
3rd " "	20	1.050	7	10
4th " "	22	1.055	7½	11
5th " "	24	1.060	8	12

Gas passing at rate of 11,600 cubic feet per hour. Ton-yield 10,300 cubic feet.

The volume of liquor delivered by the washers was by far greater than by any other drip—a fact due partly to their being early in the series, but more to their large cross-section and the low velocity of the gas through them.

We leave the important questions of ammonia manufacture, and of purification by ammoniacal liquors, for later consideration, and conclude these remarks on condensation with this statement.

Even in so equable a climate as that of San Francisco, where the thermometer falls to 32 deg. and rises to 90 deg. only three times in the course of the year, the power of any atmospheric condenser, such as the one at Howard street, varies largely; the quantity of liquor delivered by the overflows being one day as low as eight, and at other times as high as thirteen gallons per ton. Make the application yourselves.

Hydro-Pneumatic Regulator.

[We introduce the accompanying correspondence and diagrams of a very simple Regulator for Exhausters, which was first published in the Journal, August 15th, 1860. The object in this is two-fold: First because it embodies a simple and efficient automatic apparatus for regulating the speed of the exhauster, so as to keep the pressure of gas uniform; second, because we desire to have it more generally understood that the exhauster is an essential adjunct to every well regulated gas-works.

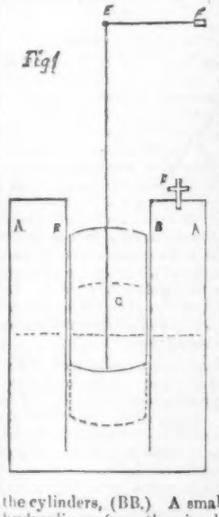
Mr. A. F. Havens, superintendent of the Brooklyn Gas-Light Company, has devised, and employs a regulator upon the same principle, but even more simple, viz., he dispenses with the double outer cylinder. The pipe leading from the exhauster is introduced directly up under the cylinder, C, which is open at the bottom and forms, in fact, a small gas-holder, which is properly weighted. A change in pressure, of course, acts directly upon the cylinder, C, causing it to rise or fall, and act upon the throttle-valve of the engine, in the same manner as previously described.

Mr. George W. Harris, formerly superintendent of the Elizabethport, N. J., Gas Works, and now of the National Coal Gas Company, N. Y., has employed a similar device, which he says works very satisfactorily. —Eds. Gas-Light Journal.]

Gas Works, Boness, Scotland,
July 18, 1860.

Messrs. Editors: I believe there was in your issue for February, an article recommending the use of exhausters for the purpose of lessening the pressure on gas retorts. With the sentiments stated in that article I concur, especially where you say that "it would, however, be dangerous to remove all pressure from the retorts, since, in case of accident, atmospheric air might enter them in sufficient quantity to cause a serious and destructive explosion. The action of the exhauster, therefore, requires to be accurately registered and placed under perfect control."

As you further "propose to discuss more fully the important functions of the exhauster and to indicate some of the ingenious improvements which have been made," and invite "communications on the subject," I venture to forward to you the following notice of an invention of mine which was brought into use in these Works a few years since, and which has fully realized my expectation of keeping "the action of the exhauster under perfect control."



The instrument—which I have called a Hydro-Pneumatic Regulator—consists of a double cylindrical vessel of tin iron, of which the accompanying sketch, fig. 1, shows the elevation, and fig. 2, the end view on the top.

The outer cylinder, (A A) is closed at the lower end, the space between it and the inner cylinder (BB), is closed at the top, (see fig 2.) The inner cylinder (BB), is open at both ends, and being shorter than AA, leaves a space at the bottom all round for the free passage of water with which the vessel is half filled (more or less, according to the number of retorts to be exhausted), as shown by the dotted line. Another cylinder, (C) closed at both ends and perfectly air tight, to act as a float works within the cylinders, (BB.) A small pipe (D, fig. 1,) from the hydraulic or from the pipe leading to the exhauster, is inserted into the space between A and B, by the aperture (D') fig. 2, by means of which the space between the cylinders A and B is filled from the water line upward with gas. Through the float (C) passes an iron rod, which is connected by the joint (E), with another rod, which is attached at F to the throttle valve of a steam engine in the same way as the ordinary ball governor.

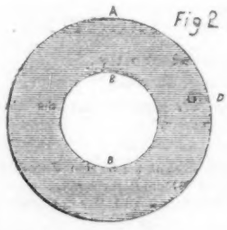


Fig 2

When the exhauster is in action, it draws off a portion of the gas contained in the space AB. The pressure of the atmosphere, in B B, forcing the water upwards in the space, AB, and causing the float to sink, as shown by the dotted lines, by which the throttle-valve is partially closed, and the motion of the engine checked in proportion.

When the retorts are newly charged and the gas evolved in great quantity, the consequent pressure on the surface of the water in the space AB, will cause the float C, to rise in the same proportion, open the throttle-valve and increasing the speed of the engine, and, consequently, the action of the exhauster As the make of gas decreases, so will *that* in AB be drawn off, and the float will consequently sink, gradually closing the throttle valve, till sh ouldthe produce of gas cease, the engine will be brought to a dead stop, even were the steam at full pressure; the action of the exhauster ceasing, of course.

The dimensions of the regulator in use here, are: Outer cylinder, AA, 16 inches deep, by 12½ inches diameter; inner cylinder, BB, 15 inches deep, by 7¼ in. diameter float; 8 inches deep by 6¾ inches diameter. The rod passing the float is ¾ of an inch in diameter. The cost of the whole about 16 shillings ($4).

The reason why I have not sooner forwarded this, is that, having had the first number of your Journal sent to me. I ordered all that were issued, and received 11 numbers more, consequently, your 8th number was a long time published before I saw it. On looking over the subsequent numbers, however, I see no further reference made to the subject, and will be glad if my communication be in any way useful.

I am, yours truly,
MALCOLM NAISMITH, Gas Engineer.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—EDS.]

A Valuable Remedy to Prevent the Freezing of Gas Pipes in Exposed Situations.

OFFICE OF THE NIAGARA FALLS GAS CO.,
NIAGARA FALLS, N. Y., Sept. 24, 1870.

Messrs. Editors: In your Journal of the 16th inst., you ask some of your readers to give their experience and remedy for the benefit of your correspondent from Mansfield, Ohio; who enquires of you how to prevent the freezing up of his gas mains of four inches diameter, exposed under an arch across a large creek, etc.

In answer to your request, I will give your correspondent a positive remedy for the difficulty he complains of.

In the first place, let him take the distance across the entire stream, and as much longer as will reach beyond frost at either end, get a wrought iron tube made, riveted up and corked like the flue of a boiler, and not less than nine inches in diameter; cut off the cast four inch mains on each end, leaving the opening thus made one foot on each end shorter than the wrought iron tube, shrink on a wrought iron washer one inch thick on each end of the severed main; slip the wrought iron tube upon one end of the cast main, far enough to enter the opposite end, then carry the wrought iron tube forward until the cast iron main is inserted in the cylinder one foot at each end; wedge the cast pipe into the center of the wrought, and caulk it with a greased hemp gasket to within an inch of the end of the wrought tube, at either end, and cast in lead the remaining inch, and caulk the lead. The wrought iron tube may be made in sections of length to suit the convenience of the location, and connected by flanges and bolts. This tube will positively remedy the difficulty complained of. It may be necessary to re-caulk the joints at the ends of the tube, after one season of expansion and contraction, but after that the joints become practically tight, as the hemp packing forms a perfect packing box at either end, that will compensate for expansion and contraction. Of course this tubing must be protected with "drips" at a point out of the reach of frost, as in that case it would, of course, freeze up, but if the "drip" is properly provided for, no temperature in Ohio will stop the flow of gas through it. I speak from seven years experience in a case identical with the one named by your correspondent. It cost me $100 each winter to keep an imperfect flow of gas through a four inch main, before I made the change; since, I have never had occesion to touch it, and it has not cost a farthing in seven years. The condensation from the gas that will pass under ordinary pressure through a four inch main, cannot condense and congeal in any temperature experienced in this section, sufficient to obstruct the flow of gas through a nine inch tube, as one nine inch tube contains more than five times the number of square inches than the four inch main.

Yours truly,
T. G. HULETT,
Eng'r and Sup't Niagara Falls Gas Co.

[The above method for preventing the freezing up of gas mains in exposed places, and all the attendant annoyances, will be very acceptable to many of the gas fraternity; and we feel quite sure the writer has earned the gratitude of more than one sorely perplexed gas superintendent.—EDS.]

A Letter from "Beyond the Seas".

C———, ENGDAND, Sept. 10, 1870.

Messrs. Editors: Perhaps one of your numerous readers will kindly answer the following questions, through the medium of your Journal:

In the gas works where I am situated, as articled pupil, there are four purifiers, 12 x 12, for oxide of iron (for removal of sulphuretted hydrogen), and two smaller ones charged with dry lime for the removal of carbonic acid. Three of the larger ones are worked at one time, with one of the smaller; one of each size being open, being or to be charged with fresh material.

The gas being tested for sulphuretted hydrogen after it has passed through the last of the three oxide purifiers, and previous to its passing through the dry lime, is found to be in laborers terms "off," therefore the *three* purifiers are foul; the gas is then shut off the first of the three through which the gas has passed, and then by an arrangement of valves, allowed to pass through the two last of the *foul* purifiers, and then through the before mentioned fresh charged purifier.

Now, what I wish to know is, whether the two foul purifiers through which the gas passes, previous to passing the "clean one," do any good towards purification, and the merits or demerits of the system I have mentioned; and whether making a supposition, that it is not immediately ascertained that the purifiers *are* "off" at the position before stated, that is, between last of oxide and the lime purifiers, it would so affect the lime, as to prevent its removing the carbonic acid by reason of the sulphuretted hydrogen (which was *not* removed from the gas the oxide being foul) contained in the gas passing through. Also I should wish to know, the reason why the gas (carbonic acid of necessity being present) before passing through the lime does *not* discolor or turn red a litmus paper; but I must here state that the scrubbing surface for the removal of ammonia is hardly sufficient, therefore I ask, does the ammonia so passing through with the gas containing also carbonic acid so neutralize it, not in combustion, but in preventing it turning the color of the litmus paper.

I am afraid that I have written rather too voluminous, but I have endeavored to be as lucid as possible. I enclose my card, and I am yours respectfully,

AN OCCASIONAL READER.

[We trust some of our numerous American or foreign readers will reply to the above interesting enquiries, which are written by one of the fraternity "beyond the sea," The phenomenon of litmus paper not changing its color when subjected to gas containing carbonic acid, has been experienced by others as we are aware, and the explanation above suggested, that it may be owing to the neutral action of ammonia, is in our opinion the true one.—EDS.]

Letter from Mr. Smedberg.

SAN FRANCISCO GAS WORKS,
September 24, 1870.

WM. FARMER, ESQ.,
Civil and Consulting Gas Engineer.

My Dear Sir: Many thanks for your note of Sept. 13th. The only way for my friends in the East to secure the "Synopsis" is to work for it. If every one of the present subscribers were to do *one-tenth* the canvassing I have exercised here, the subscription list would run up to 600 within a fortnight. It is in their own interest—not mine—that I urge this diligence. What I know to be the most comprehensive work on Gas-Lighting, published or possible, is ready for them as soon as subscribers will make a really effective request for it.

You may use your judgment as to the publication of this note. Yours faithfully,
JAMES R. SMEDBERG.

Pleased with the Journal.

ATHENS, GA., Sept. 26, 1870.

Messrs. Editors: Enclosed I send you three dollars for my subscription to the Gas-Light Journal. * * I am so pleased with it that I cannot do without it.

Respectfully yours,
JOHN H. NEWTON.

Directions for Securing Copyrights

UNDER THE REVISED ACT OF CONGRESS, WHICH TOOK EFFECT JULY 8, 1870.

1. A printed copy of the title of the book, map, chart, dramatic or musical composition, engraving, cut, print, photograph, chromo, or design for a work of the fine arts, for which copyright is desired, must be sent by mail, addressed,

LIBRARIAN OF CONGRESS,
Copyright Matter. WASHINGTON, D. C.

This must be done before publication of the book or other article.

2. A fee of 50 cents, for recording the title of each book or other article, must be inclosed with the title as above, and 50 cents in addition (or $1 in all) for each certificate of copyright under seal of the Librarian of Congress, which will be transmitted by return mail.

3. Within ten days after publication of each book or other article, two complete copies of the best edition issued must be mailed to perfect the copyright, with the address,

LIBRARIAN OF CONGRESS,
Copyright Matter. WASHINGTON, D. C.

If the above direction is complied with, both books and titles will come free of postage, and postmasters will give receipt for the same if requested. Without the deposit of copies above required, the copyright is void, and a penalty of $35 is incurred.

Copyrights recorded at a date prior to July 8, 1870, in any district clerk's office, do not require re-entry at Washington. But one copy of each book or other article published since March 4, 1865, is required to be deposited in the library of Congress, if not already done. Without such deposit, the copyright is void.

No copyright is valid unless notice is given by inserting in the several copies of every edition published, on the title page or the page following, if it be a book; or if a map, chart, musical composition, print, cut, engraving, photograph, painting, drawing, chromo, statue, statuary, or model or design intended to be perfected and completed as a work of fine arts, by inscribing upon some portion of the face or front thereof, or on the face of the substance on which the same is mounted, the following words, viz: "Entered according to act of Congress, in the year ——, by —— —, in the office of the Librarian of Congress at Washington."

6. Each copyright secures the exclusive liberty of publishing the book or article copyrighted for the term of 28 years. At the end of that period, the author or designer (not the proprietor) may secure a renewal for the further term of 14 years, making 42 years in all.

7. Any copyright is assignable in law by any instrument of writing; but such assignment must be recorded in the office of the librarian of Congress within sixty days from this date. The fee for this record is 15 cents for every 100 words, and 10 cents for every 100 words for a copy of the record of assignment.

8. In the case of books published in more than one volume, or of periodicals published in numbers, or of engravings, photographs, or other articles published with variations, a copyright must be taken out for each volume of a book, or number of a periodical, or variety, as to size or inscription, of any other article.

9. To secure a copyright for a painting, statue, or model or design, intended to be perfected as a work of the fine arts, so as to prevent infringement by copying or vending such design, a definite description of such work of art must accompany the application for copyright, and a photograph of the same, at least as large as "cabinet size," should be mailed to the librarian of

Congress within 10 days from the completion of the work.

10. In all cases where a copyright is desired for any article not a book, the applicant should state distinctly the title or description of the article in which he claims copyright.

Brooks' Paraffine Insulator.

The following is from the Philadelphia *Inquirer*:

"David Brooks has issued a circular pamphlet in reference to his Patent Paraffine Insulator. This circular contains about forty certificates. Some are from the highest authorities in this country and in Europe. Prof Morse, in his late report to Congress, speaks of this invention in the highest terms.

"Besides certificates, the pamphlet contains an interesting article on the subject of insulation. The American certificates are from railroad companies who have adopted this insulator with great success.

"But the great proof of this worth is the guarantee of the inventor. The guarantee is to exceed the ordinary glass insulator, in wet weather, one hundred times, which is equivalent to exceeding the English standard of megohm per mile fifty times, and he agrees to maintain for any length of time this immense difference, at a compensation of two dollars per mile per annum, for one wire, and three dollars per mile for two wires and this sum to include the replacing all broken or defective insulators.

"Although the first cost of this insulator is about twice that of the ordinary insulator, the subsequent cost of maintenance makes the Paraffine Insulator much the cheaper, not taking into account the vast difference of results obtained.—*Telegrapher, March 5.*"

On which the *Railroad Record* comments as follows:

"The insulators most in use by the telegraph companies of this country are the common glass. Twenty years since this style of insulator was generally used in Europe, but porcelain was substituted to so great an advantage that in five years, say fifteen years ago, there was scarcely a glass insulator in use, and European telegraphers now look upon the era of glass insulators as among the dark ages of the telegraph. Porcelain, though inferior to the Brooks, is vastly superior to glass. The reason why glass has been so much used by telegraph companies is on account of its cheapness, or rather less first cost.

"If telegraph companies had been organized for the simple purpose of doing a legitimate telegraph business, glass insulators would not at this day be used; but a different object was in view, and that object—speculation. The money subscribed to build lines went into the pockets of the originators of these schemes, except a very small portion, and this portion was expended for the cheapest of material. If the money subscribed had been honestly applied, telegraph stocks would have proved a better investment.

"The Western Union Telegraph lines were an aggregate of these flimsy and ephemeral structures, but they are now being rebuilt in a very substantial manner, and this improved insulator used with great success,

"The same can be said of the railroad companies using the insulator. Their wires are put for the purpose of telegraphing, and not as a speculation."

Gas Wells for Heating Boilers.

The Erie (Pa.) *Republican* states that in that city several gas wells are in operation with favorable results. The one recently finished at the Canal Mills was commenced about a month ago; and two forty horse-power boilers are now heated by the gas. The well is 493 feet in depth, and cost, including casing, pipe, etc., about $1,500. The supply of gas is abundant, and is thought to be sufficient to drive two additional run of stones. When they were running fifteen hours per day, the cost of the coal was $400 for June. Now, for the interest of $1,500, or $8.75 per month, they have a sufficient supply of fuel to run continually, a saving of nearly $5,000 per annum. With regard to the continuation of the supply, they can only go by the precedents furnished in the same locality.

The Althoff well, in the same city, produces as much gas as when it was sunk eight years ago. Messrs. Busseck & Clark have also recently put down a gas well, at a cost of $1,600, to a depth of 503 feet. The gas which is consumed under the stills and boiler of a petroleum-refining establishment, is supplied more abundantly even than in the Canal Mills well, and is estimated as sufficient for the boiler of an engine of two hundred horse-power.—*Am. Artisan.*

Method for Purifying Illuminating Gas.—E. Pelouze modifies the Lamming mass now generally employed for the purpose of purifying illuminating gas, by adding sulphuric acid. He sprinkles the purifiers containing oxide of iron and sawdust, with water, to which 20 per cent of sulphuric acid, of specific gravity 1·53 (53° B), has been added, and after the mass has dried up sufficiently, passes the gas through. After use it is necessary to restore the sulphuric acid, and to remove the sulphate of ammonia that may have been formed. It is said that naphthalin is not removed from the gas by this method. A mixture of oxide of iron and sawdust thus prepared would serve an excellent purpose as a disinfecting agent, to be added to the earth in the earth closet, in stables, cess pools, and the like, but where it has to come in contact with metals, care must be taken not to have free sulphuric acid present. Ordinary copperas, or sulphate of iron and sawdust, with native hematite, or bog-iron ore, would also make a valuable disinfecting mixture, and would be cheap.—*Exchange.*

"Synopsis of British Gas-Lighting."

The following subscribers to the above work are acknowledged, making in all 239:

Henry J. David-on, Engineer, 77 Liberty st, N. Y.
Mercantile Library, San Francisco.
Wm. W. Beggs, San Francisco.
Mechanics Institute, San Francisco.
John Atkinson, Jr. Peoples Gas Light and Coke Co., Chicago, Ill.
Geo. A. Farwell, Supt. Mew York Gas Works Building Co., Lawrence, Kansas.
Jesse W. Starr & Sons, Camden, N. J., 2 copies.

Prices of Gas Coals—October, 1870.

[Corrected by Louis J. Belloni, Jr., 73 Pine st., N. Y.]

PROVINCIAL—DUTY, $1.25, GOLD.

	Coarse.	Slack.
Block House	$1 75 a	0 75
Gowrie	1 75 a	0 75

[Corrected by Bird, Perkins & Job, 86 South st,]

	Coarse.	Culm of Coal.
Pictou	$2 25 a	1 25
Sydney	2 25 a	0 80
Lingan	1 75 a	0 80
Little Glace Bay	1 75 a	1 00
Caledonia	1 60 a	0 80

A discount from the prices of the coarse coal on purchase of 5000 tons and upwards. Duty, $1.25 per ton, gold, on the coarse coal; 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack
	Currency.	
Fairmount Gas Coal Co. of N. Y.	$7 50 a	0 00
Despard Coal Co.	7 50 a	0 00
Penn.	— a	—
Newberg Orrel Gas	— a	—
West Fairmount Gas Coal.	8 00 a	—

FOREIGN COALS—SEPT. 1870.

DUTY, $1.25 PER TON.

[Corrected by Parmelee Bros., 32 Pine street, N. Y.]

Liverpool Gas Caking	$8 00 a	—
" " Cannel	10 00 a	12 00
" House	13 50 a	15 00
" " Orrel	12 00 a	14 00

Per ton 2,240 lbs. ex ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00 a	17 50
" " Cannel "	18 00 a	20 00

Per ton 2,000 lbs. delivered.

Prof. Helmholz, late of Heidelberg, where he has honored the University by many brilliant researches in physics, has accepted the chair made vacant in Berlin by the death of Magnus.

The development of the Illinoes coal fields is said to be due to a farmer near Springfield, who thought that such a country could not be destined by Providence to be without fuel. "The wood is nearly gone," said he to himself, "and there must be coal." In this almost whimsical faith he sunk a shaft 160 feet, and then struck a vein of bituminous coal, which he is now mining to the amount of $2,700 per week.

A SYNOPSIS OF

BRITISH GAS LIGHTING.

To be Published Shortly.

'WINNOWED.—The wheat carefully preserved, and the chaff thrown away."

This work will comprise the essence of the London *Journal of Gas-Lighting*, from February 10, 1849, to December 31, 1867, and afford a succient resume of the entire English Gas Engineering between these dates.

The excerpts will, as far as possible, be symmetrically arranged under the heads of Coals, Distillation, Purification, Volumetry and Photometry.

It is to be executed by JAMES R. SMEDBERG, Engineer San Francisco Gas-Light Company. Subscriptions should be addressed to the offices of the AMERICAN GAS-LIGHT JOURNAL, 42 Pine st Room 18, New York.

It will be issued only to subscribers.

It will be of great value, not only to Gas Companies and Engineers, but to those who represent the enormous collateral interests of Gas Lighting—to chemists, Gas-Fitters and Patentees, as well as to scientific men generally.

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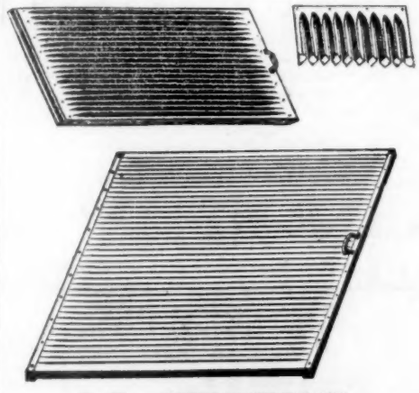

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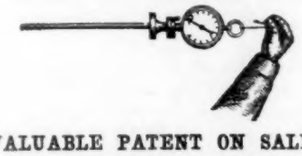

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[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

MONDAY, OCTOBER 17, 1870.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

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GENERAL EDITORIAL.

GAS FOR HEATING, COOKING, ETC.

Notwithstanding the use of coal gas for illuminating purposes has, and is extending rapidly, and its merits as an economical source of artificial light have been generally conceded, yet, in this country at least, its adoption as a caloriffic agent has been so slow as to disappoint the sanguine hopes of its early advocates.

The advantages claimed for gas as a source of heat for domestic purposes are many, and while it is capable of diffusing a temperature sufficiently elevated for culinary purposes, and for warming large apartments, yet comparatively little of it is employed for these purposes, and coal and wood fires yet retain their ascendancy. Among the advantages claimed for gas are cleanliness and freedom from trouble, it being unnecessary to carry coal or other fuel, or to remove ashes, etc. The rapidity with which heat may be generated, and the ability to instantaneously extinguish the fire are also great recommendations—particularly in summer—when it is desirable to perform the duties of the *cuisine* with as little elevation of temperature as possible.

In England, and particularly in London, gas is largely used for cooking, and it is said to perform the office acceptably. At a recent meeting of the British Association of Gas Managers (June 7) held in London, and which was published in this Journal June 16th, it was shown that gas stoves for cooking were introduced at Maidsone, and so satisfied were the consumers with the use of these stoves, that it was found difficult to supply the demand, and the summer consumption of gas was largely increased thereby. These stoves have also been introduced in this country by Mr. A. L. Bogart, a scientific gentleman of New York City, who possesses also mechanical abilities, of a high order, and has made the subject of utilizing gas for heating and cooking, etc., a specialty for many years. He has made a number of very important patented improvements in gas burning and heating apparatus, until it may be considered nothing further in this branch of improvement is required. These gas-stoves heaters, etc., are neat and ornamental in size; they are compact and require but little space, and can be quickly set up in any room, as no flue is necessary. This gentleman has invented simple and cheap gas-heating apparatus for the use of barbers, ladies hair toilette, and for fine laundry work, fluting, crimping, etc; also for medical baths and vapor treatment; for chemical manipulation, assayists, and in fact, he has made a specialty for almost every trade or profession where heat is required, and where gas cannot be had, naptha, or kerosene can be used with equal safety and effect.

Mr. Bogart's apparatus for heating apartments operates upon the principle of the decomposition or burning of the gases (oxygen and hydrogen) producing a vapor which, mingling with the caloric furnishes a delightfully humid atmosphere. The deleterious products of combustion are neutralized within the stove by the introduction of a well known chemical agent. Physicians recommend the "Metropolitan Gas Heating Stoves" to patients troubled with bronchial or lung affections. To young couples or for large families we know of nothing more economical or convenient than these cooking stoves and ranges. The smallest is capable of cooking a substantial meal while the larger sizes are furnished with kettles, saucepans, boilers, broilers, steamers and all the culinary utensils necessary for getting up even an elaborate dinner. The ranges, small and large, are furnished with appliances for heating water for baths, washing, etc.

That the calorific properties of gas are equal to most other agents used for heating is proved by the fact, that in analytical chemical laboratories charcoal and other fires have been, to a considerable extent, replaced by gas, and the operations of boiling, evaporating, fusion, ultimate organic analysis, are now performed by easily-regulated gas furnaces, their use conducing far more to the personal comfort of the operator, than the troublesome and cumbersome stoves formerly employed.

For families living in apartments, where the trouble and expense of carrying coal or other fuel would be great, gas has proved a great desideratum. Having all these advantages, it may appear strange that it is not more generally adopted; doubtless it would be, but from the fact that at the average price which is paid for gas in this country, the ordinary method of generating heat have heretofore had the preference, because of their being thought more economical, and thus better suited to the wants of the public.

The improvements now being introduced by Mr. Bogart for economizing the consumption of gas, and consequently materially reducing the cost, compares favorably with other fuel, and in many cases has been found in practice, to have the advantage, even in this respect.

We hope, therefore, before long to see them more generally adopted in every household, and we are convinced that after a trial none will wish to return to coal fires, with their concomitants of dust and ashes, and their consequent deterioration of carpets, hangings, and furniture. These stoves may be seen in operation at the store of the inventor, 702 Broadway, New York.

THE BRITISH GAS MANAGERS ASSOCIATION.

A grand feature of the Summer season last past in the Gas World, has been the Seventh Annual Convention of the *British Association of Gas Managers* in London, last June. However irksome it may have been to this eminent body of gentlemen, the practical "Illuminati" of England, to have had of late years all their operations sifted and investigated by Parlimentary Commissions, and subjected to scientific and official tests and restrictions of a Procrustean character, it is clear that the general results in the way of stimulus to investigation and inquiry, and the spread of exact knowledge, are to be of incalculable benefit, not only to the Science of Illumination, or *Practical Photics*, as we may call it, but also, in a reflex but perfectly obvious way, widely and mutually to themselves. A partial list, which I shall hereto append, of the subjects brought up and discussed, at this memorable meeting in June, will illustrate this. It is our intention, in due time, and as fast as we can command our too limited space, to skim the cream from this rich body of material, and persent the feast to our readers, with such comments and annotations as may be practicable. One practical paper of the highest value we have already given in full: Mr. CATHELS on the "Setting and Working of Retorts," as well as a very full digest of the Acting President's address. In the last issue we found but little space, but gave an important paper of Mr. ALFRED UPWARD on Mr. HILLS "Mode of Purifying Gas Liquor for use in Gas Purification."* Some remarks on this from the *London Journal of Gas Lighting* are quoted at the conclusion of this note.

In this issue we are much occupied with a recent most important "Report of the London Gas

* In our reprint of this the name of the author was omitted, for which we apologize.—EDS.

Referees on the Sulphur Question," with notes and comments; but hereafter shall make every effort to reproduce the substance of the following papers read at the June meeting:

Mr. GODDARD, of Ipswich; "On the Application of Gas to the Generation of Steam."

KIRKHAM & SUGG; "On Photometry."

F. W. HARTLEY; On the same subject.

Mr. METHVEN; "On Tar Pavement."

GEO. T. LIVESEY; "On Scrubbers."

W. J. WARNER; "On Gas Meters."

Dr. H. LETHEBY; "On Different Methods of Purification," (a *most valuable* digest, which we shall give in full).

CHARLES HEISCH, recently appointed Gas-Examiner to the Corporation of the City of London; "On Burners for Testing Gas," (the substance of which seems unimportant, save one paragraph, of a rather personal nature, of which we have taken note in another column); and a paper by W. T. FEWTRELL, "On Artificial Alizarine, or Madder-Red from Coal Tar," from which we may take some notes; and others.

We have also a commencement of report of the Proceedings of the Ninth annual meeting of the *North British Association of Gas Managers*, at Edinburgh, in July; consisting of the address of the President, Mr. THOMAS WHIMSTER, Engineer of the Perth Gas Works, relating to the following topics:

Manufacture of Paraffine by Gas Companies.

History of the Oxyhydrogen "Will-o-the-wisp" in Perth.

The Sperm Candle Standard and the Duration Test; and so on.

I shall here make an appeal to our American Gas Public, whose future lies before them so bright and so full of promise. How much longer are *we* to remain without any general or national organization, without any means of intercommunicating or disseminating the numerous new and important observations we make, and of discussing, in general convention, subjects which pertain to the general weal of our fraternity? When shall our future *American Association of Gas Managers* take root, and spring up, to ramify and overspread this Continent, so soon to be the seat of a civilization more fruitful and of a nation mightier than the world has yet seen; a Continent whose endowment by nature is so unparalleled, and into whose lap the energy of the human race is now continually pouring and concentrating? In the solution of this question we have not heretofore been idle, and can clearly claim to have so far done our part, so far as in us lies. It is but two or three years since we spent much labor and space, and shed much ink, in endeavoring to initiate this great movement. Out of our proposed National Convention of Gas Engineers would, without doubt, have germinated such an Association as that we now foreshadow. We may truly say to American gas men: "We have piped to you and ye have not danced."

Nevertheless we deem it our duty to continue to set before our gas fraternity the importance, nay the necessity, to the establishment of their true status in the general community, and the maintenance of the position and influence to which they are justly entitled and which they ought, *if only in their own defence*, to occupy; of *organization*, of union of force and purpose, and of opportunities of periodical meeting for common interchange of experience and joint deliberation. Union is strength.

HENRY WURTZ.

[From the London *Journal of Gas-Lighting*, Sep. 13.]

"Now that the thoughts of gas engineers are especially directed to purification, we may call attention to Mr. F. C. Hill's apparatus for depriving ammoniacal liquor of its carbonic acid and sulphuretted hydrogen, so that it may be used more effectively for scrubbing. The apparatus was described at one of the meetings of the British Association of Gas Managers by Mr. Upward, and his description will be found at page 581. The first idea of using a desulphuretted liquor for the removal of sulphuretted hydrogen belongs we believe, to Mr. Laming. It has been carried out, as our readers know, with much success by Mr. George Livesey. Mr. Leigh, of Manchester, too has patented a process for the partial desulphuration and concentration of ammoniacal liquor for use in purification. In relation to these processes we may remark that the complete purification of gas from sulphuretted hydrogen by previously desulphuretted liquor can never be relied upon, while such liquor appears to have little or no action in the removal of bi-sulphide of carbon or sulphuretted hydrocarbons, which are beyond all doubt to a great extent taken out by foul liquor. We may throw out also the idea—little likely, we fear, to be completely realized—that the use of liquor purified by Mr. Hill's apparatus and of foul liquor in separate scrubbers, might possibly effect a reasonable purification of gas by the simple use of a gas product."

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It is with profound sorrow that we learn of the death of Mr. Sabbaton, the eminent Gas Engineer of the Manhattan Gas-Light Company, aged 45 years, which occurred on Wednesday, the 13th inst. at 4 o'clock, P. M. The lateness of the hour at which we received this sad intelligence, prevents us from giving more than this brief notice, until our next issue.

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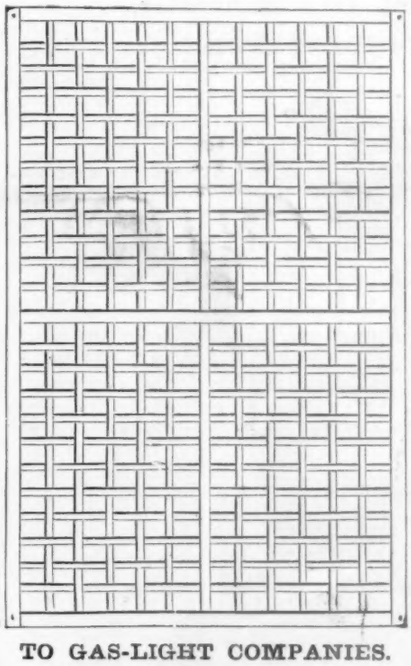

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3rd. The saving of lime and labor, as the screens are not liable to clog, and are easily cleaned,

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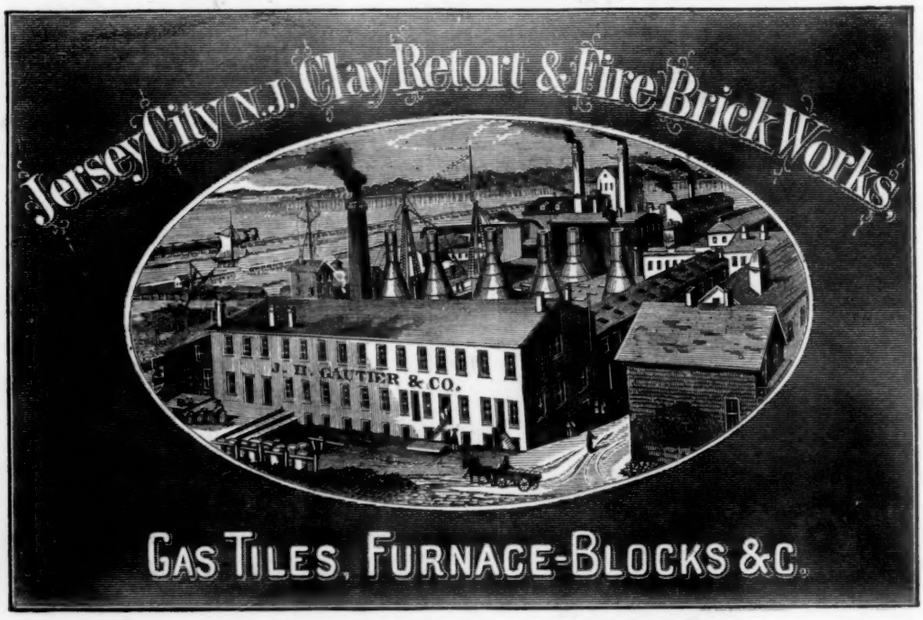

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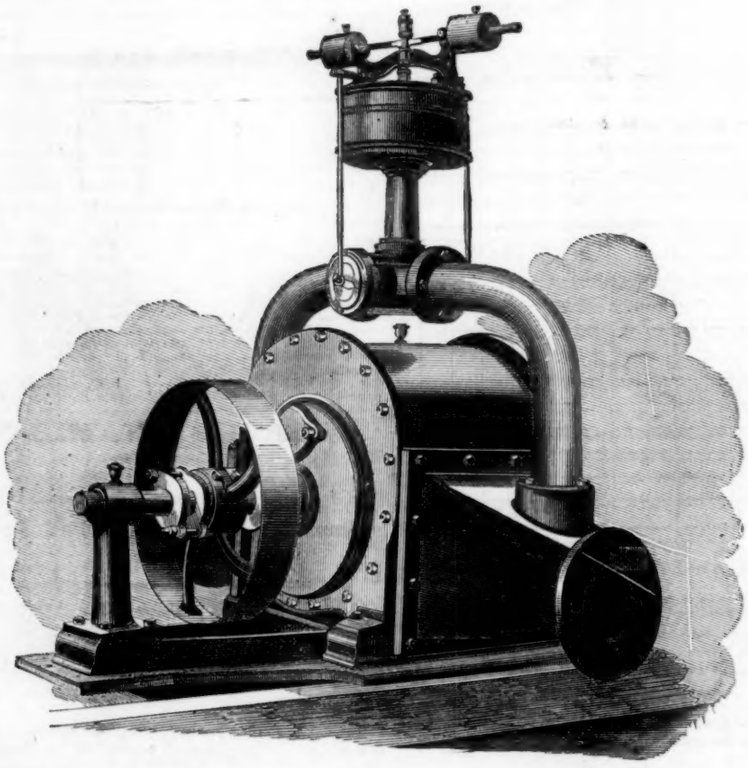

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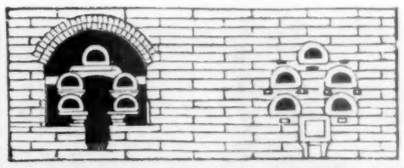

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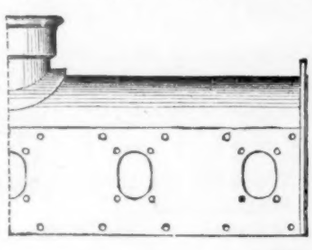

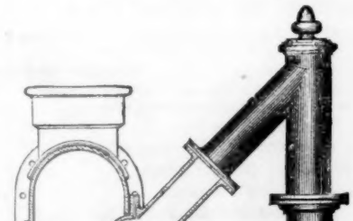

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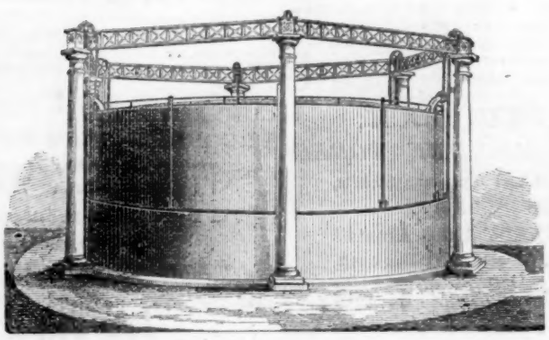

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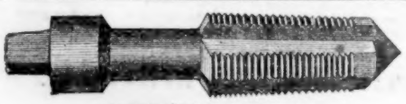

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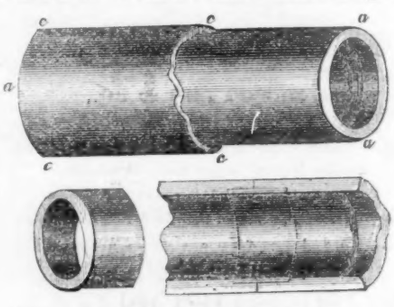

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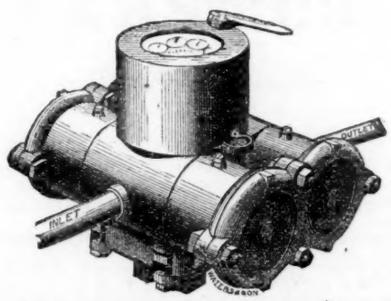

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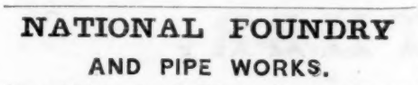

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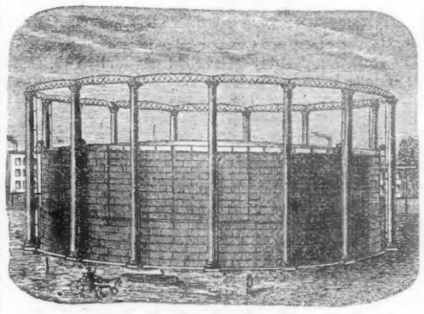

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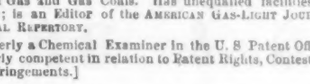

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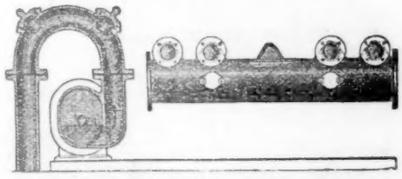

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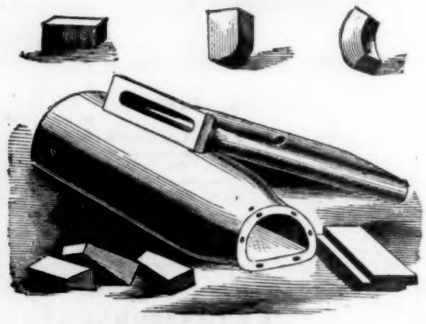

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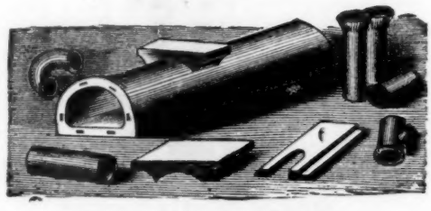

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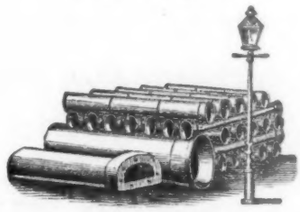

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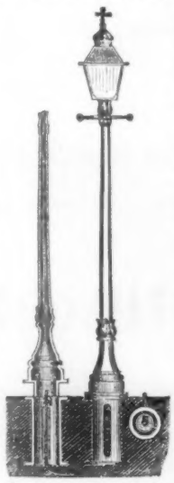

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NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau street.
BOSTON—S. M. PETTENGILL & Co., No. 6 State Street.
PHILADELPHIA—COX, WETHERILL & Co., Ledger Building, Phil'a
Germany ..... B. WESTERMAN & Co., of New York.
Great Britain....TRUBNER & Co., 60 Paternoster Row, London
France..... LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonnière
Brussels, Belgium—HENRI BERGE.

☞ All communications to be addressed to "The Editors, No. 42 Pine Street, New York.

NOV 5 1870